Poster Session

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Exploring the full spectrum of right ventricular exercise contractile reserve among health and disease: a prospective clinical and echocardiography observational multi-center study

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OnBehalf: RIGHT-NET

Background: Exercise Doppler echocardiography (EDE) has been implemented for applications beyond coronary artery disease detection, but its role in assessing subclinical pulmonary vascular disease and right ventricle (RV) impairment is less clear. The RIGHT heart international NETwork (RIGHT-NET) is a prospective clinical and echocardiography observational multicenter study designed to explore the full spectrum of RV function and non-invasive pulmonary circulation hemodynamics during exercise in a large cohort of subjects, from healthy individuals and elite athletes to patients with overt or at risk of developing pulmonary hypertension (PH). Right ventricular (RV) exercise contractile reserve (RVECR) can be assessed through the ratio between tricuspid annular plane systolic excursion (TAPSE) and systolic pulmonary artery pressure (sPAP) and has proved to provide prognostic value in patients with left heart disease (LHD) and pulmonary arterial hypertension (PAH).

Methods: We enrolled 1424 patients (age 55.4 ± 15 years old, 44.4% males): 353 healthy controls, 40 athletes, 369 patients with cardiovascular risk factors (CVRF: arterial hypertension and/or diabetes mellitus), 46 with PAH (confirmed by right heart catheterization), 487 with systemic sclerosis (SSc) without overt PH, and 129 with LHD (including coronary artery disease and heart failure with reduced or preserved ejection fraction).

All enrolled subjects underwent resting and EDE examinations on a semirecumbent cycle ergometer with an incremental workload of 25 Watts every 2 minutes up to the symptom-limited maximal tolerated workload, according to standardised protocols. Key echocardiographic measurements have been acquired at baseline, at 50 Watts, at peak exercise, and after 5-minutes recovery, including but not limited to RV function (TAPSE) and sPAP.

Results: In all six groups the ratio TAPSE/sPAP was significantly different at peak exercise compared to rest values (all $p < 0.01$). At rest, TAPSE/sPAP values were not significantly different among controls, athletes and CVRF patients, whereas during exercise TAPSE/sPAP values were significantly different, with CVRF showing the lowest values ($p < 0.0001$ vs controls and athletes). Patients with PAH and LHD had the worst RVECR both at rest and at peak exercise (all $p < 0.0001$ vs the other groups), while SSc groups reported intermediate values, which were lower than controls ($p < 0.0001$) and athletes ($p < 0.0001$), but higher than CVRF subjects ($p = 0.003$). (Figure)

Conclusions: EDE can non-invasively characterise different dynamic behaviours of the RVECR among healthy subjects, athletes and patients with various pathologic conditions. Whether a thorough EDE assessment of non-invasive hemodynamics, RVECR and coupling may predict later development of manifest PH, clinical deterioration or decreased survival will be further investigated during the ongoing follow-up.

Abstract P1711 Figure